

**A NEW SPECIES OF *TORYMUS* (HYMENOPTERA:
TORYMIDAE) PARASITIC ON *PACHYPSYLLA*
CELTIDIS-VESICULA RILEY (CHERMIDAE)
WITH NOTES ON ITS BIOLOGY AND
OTHER PARASITIDS ATTACKING
THE SAME HOST AT COLUMBUS,
OHIO**

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The genus *Torymus* is a group in which the vast majority of species are ectoparasitic on dipterous or hymenopterous gall makers. Three species, however, have been recorded from Homoptera, one on the eggs of Cicadidae and two others as gall parasitoids of the genus *Pachypsylla* which are gall makers on *Celtis* sp. (hackberry). *Torymus pachypsyllae* (Ashmead)

is recorded, Ashmead (1888), from twig galls of *Pachypsylla venusta* (Osten Sacken). An additional host record is supplied by Lienk (1951), who records it from the leaf galls of *Pachypsylla celtidis-mamma* (Riley) the hackberry nipple gall maker. Another species, *Torymus scalaris* (Huber), is recorded from twig galls, Huber (1927), of *Pachypsylla celtidis-gemma* Riley.

In September 1950, several specimens of *Torymus* were reared from leaf galls of *Pachypsylla celtidis-vesicula* Riley (pl. II), the hackberry blister gall maker. They were identified by Mr. A. B. Gahan as a new species, which is described below. Dr. B. D. Burks identified the rest of the Chalcids listed in this paper.

Torymus vesiculi n. sp.

Female: Head metallic green, as wide as long, frontal aspect almost oval in outline; frons finely shagreened, and clothed with short, narrow, suberect, white hairs, these more abundant below attachment of antennae; bases of antennae separated by a prominent carina extending halfway to mouth; greatest diameter of lateral ocellus equal to two-thirds the ocellular distance; scape yellow, as long as intermalar distance; pedicel and ring joint brown, funicular segments brown, closely set with short, dark brown hairs, first segment shorter than last but all longer than wide, the first segment shorter than pedicel, club slightly wider than funicle, longer than last two segments of funicle combined. Thorax elongate, metallic green with cupreous reflections; dorsum finely punctuate and clothed with moderately long, feebly appressed white hairs; parapsidal grooves deep; scutellum longer than wide, cross furrow absent; propodeum cupreous to green, with a distinct longitudinal median carina, strongly arched from scutellum; area laterad of spiracle rugose and clothed with long, erect, white hairs. Abdomen strongly compressed and short, as long as thorax in average dried condition, tergites finely reticulate; posterior margins of second and third tergites each with a deep longitudinal median incision, fourth with a shallow median incision; abdomen sparsely covered with setae, third tergite with one row of setae; sheath of ovipositor three-fourths as long as the abdomen and thorax combined. Legs yellow except base of middle and hind coxae which is concolorous with thorax; hind tibia blackish; tarsi whitish.

Male: (Fig. 3.) Head metallic green to cupreous, slightly wider than long; ocelli larger than in female; scape light brown and shorter than intermalar distance. Thorax less arched than in female.

Measurements: Female: Length of dried specimen 1.30 to 2.10 mm. (Holotype 2.10 mm.). Ovipositor sheaths 0.8 to 1.30 mm. (Holotype 1.30 mm.). Male: Length 1.3 to 1.9 mm. (Allotype 1.3 mm.).

Specimens of this species are frequently distorted by drying.

Material examined: All material from Columbus, Ohio collected on *Celtis occidentalis* L., the majority of females ovipositing in host galls. Female holotype (9-15-53) and male allotype (8-7-54) deposited in U. S. National Museum. Twenty-two female and 13 male paratypes deposited in the following institutions: British museum one female, one male (9-15-53); U. S. National Museum five females, five males (9-15-53); Cornell University

three females, four males (8-7-54); Ohio State University seven females, two males (9-15-53); Kansas State College six females, one male (9-15-53).

Discussion: This species is closely related to *Torymus pachypsyllae*, but B. D. Burks (personal communication) says that it is closer to *T. capite* (Huber), which I have not examined. *T. vesiculi* differs from *T. pachypsyllae* as follows: Smaller. Head more transverse; ocellular distance and lateral ocellar line greater (figs. 5 and 6); the first segment of the funicle of female nearly as long as the last whereas in *T. pachypsyllae* the first segment is longer than the last (figs. 2 and 4). Abdomen strongly compressed and short; tergal hairs fewer in number and fewer in rows. Hind tibia blackish. Only minor differences were found in the ovipositors (figs. 7 and 8) and male genitalia. *T. pachypsyllae* distorted little upon drying.

Torymus vesiculi is a primary external parasitoid of the fourth and fifth instars of *Pachypsylla celtidis-vesicula*, the attack beginning in midsummer. The galls were checked weekly in 1954 from early spring to September 9 and the first specimens were observed August 7. They occurred in one locality in a characteristic swarm of about 100 individuals around the leaves and were composed mostly of males. One female was definitely observed ovipositing on August 7. By August 14 the wasps were generally distributed throughout the half-mile stretch of hackberry along the bank of the Olentangy River at the Ohio State University directly south of the new hospital where most of the observations have been made. Only three females were collected August 28 and observations on September 2 revealed that not one wasp was to be seen although the conditions were apparently optimum. However, by September 9 the wasp was found to be present in great numbers again and upon examination the galls revealed only eggs of the parasite. The wasp has been observed in previous years to be active and laying eggs until the leaves fall in October. My observations indicate that there are apparently three generations, the third overwintering. Only fifth instar larvae are to be found in the overwintering galls in the spring. This fact, as substantiated by Smith (1953), provides a means of control for *P. celtidis-vesicula* which often becomes a pest. The fact that the Chermids emerge in the fall and overwinter as adults whereas their parasites overwinter as larvae or pupae in the galls makes it a poor practice to rake and burn the leaves of this tree because this destroys the parasitoids.

T. vesiculi can be reared indoors from the leaves, and if not subjected to cold, it will emerge about January 1. The chances of it emerging are much better if it is left inside the gall, a small hole being carefully made in the gall to facilitate emergence. The wasp cannot emerge from the dry galls because they become too hard for the wasp to cut with its mandibles.

After the leaves have fallen a parasitized gall can be recognized by the fact that there is no hole in it where the Chermid has emerged. The larva is similar to that described by Hobbs (1950) for *T. festivis* Hobbs. Varley (1937) gives a similar description for the larva of *T. cyanimus* Boh. The average oviposition time, which has been observed in several specimens, varies from 30 to 45 minutes. The egg is laid next to the nymph, which is stung and immobilized as described by Beard (1952). The oviposition time seems long compared to that of a species of *Eupelmus*, which was observed

to accomplish the same process in nine minutes on the same species of gall.

As many as 100 Chermid galls may occur on a leaf and from 0 to 100 per cent may be parasitized, usually about 50 per cent. All of this parasitism is not due to *T. vesiculi*. Another Chalcidid, *Eupelmus* sp., has been observed ovipositing a few times in September and the third instar is attacked by two undescribed species of Eulophidae, one presumably of the genus *Chrysocharoideus* Girault and the other which may be a new genus of the subfamily Tetrastichinae near *Quadrastichodella* Gir., B. D. Burks (personal communication). Both forms are very abundant only during the month of July, fading out just before *Torymus* appears. Still another Chalcidid, *Psyllophagus pachypsyllae* (How.) (Encyrtidae), which is the only parasitoid found to be internal, has been found in the galls. This Encyrtid is not generally common and occurs in small populations which are sporadically distributed. However, of the parasitoids of *P. celtidis-vesicula*, this species is the only Chalcidid found which will attack other species of the genus *Pachypsylla*, all of the other Chalcidid parasitoids being apparently host specific. All members of the genus *Pachypsylla* in Ohio have been recorded as being parasitized by *Psyllophagus pachypsyllae* except *Pachypsylla intereris* Mally, Smith (1953) and Moser (1954), and I found numerous specimens of this parasitoid overwintering in the galls of this Chermid at Put-in-Bay (Gibraltar Is.) Ohio on May 17, 1954. *Psyllophagus pachypsyllae* is the only parasitoid of *P. celtidis-vesicula* to overwinter in the pupal stage within the remains of its host. I have collected only the pupal stage of this parasitoid, and examination of the nymphal skins of the host in which the parasite pupae are encased reveals that it is probably the third stage that is attacked.

A sixth parasitoid found in the galls of *P. celtidis-vesicula* is a member of the family Cecidomyiidae (Diptera). It was found feeding upon a third instar nymph on July 17, 1954. In previous years this larva had been found in unopened galls but its definite relationship had not been established. It is yellow in color and overwinters as a last stage larva. It is not common. This parasitoid may have an even wider host range than *Psyllophagus pachypsyllae*. I have found similar yellow larvae which I assume are parasitoids, in the galls of several of the hackberry Cecidomyid gall makers which have white larvae. Lal (1934) records an interesting account of a Cecidomyiid (*Endopsylla*) as a parasitoid of a Chermid (*Psylla pyricola*) in Scotland.

Predators: *Formica fusca* was observed carrying away the adults of *P. celtidis-vesicula* on September 20, 1953, and the two-spotted lady beetle also has been observed to eat the adult.

Few observations have been made on *Torymus pachypsyllae* but it apparently undergoes much the same type of life cycle on *Pachypsylla celtidis-mamma* as does *T. vesiculi* on *P. celtidis-vesicula*. *Pachypsylla celtidis-mamma* is the species most closely related to *Pachypsylla celtidis-vesicula* and the latter is about 100 times more abundant and its parasitoid, *Torymus vesiculi*, is about 100 times more abundant than *Torymus pachypsyllae*, the parasitoid of *Pachypsylla celtidis-mamma*. *Torymus pachypsyllae* is apparently the only parasitoid of *Pachypsylla celtidis-mamma* in Ohio. There is

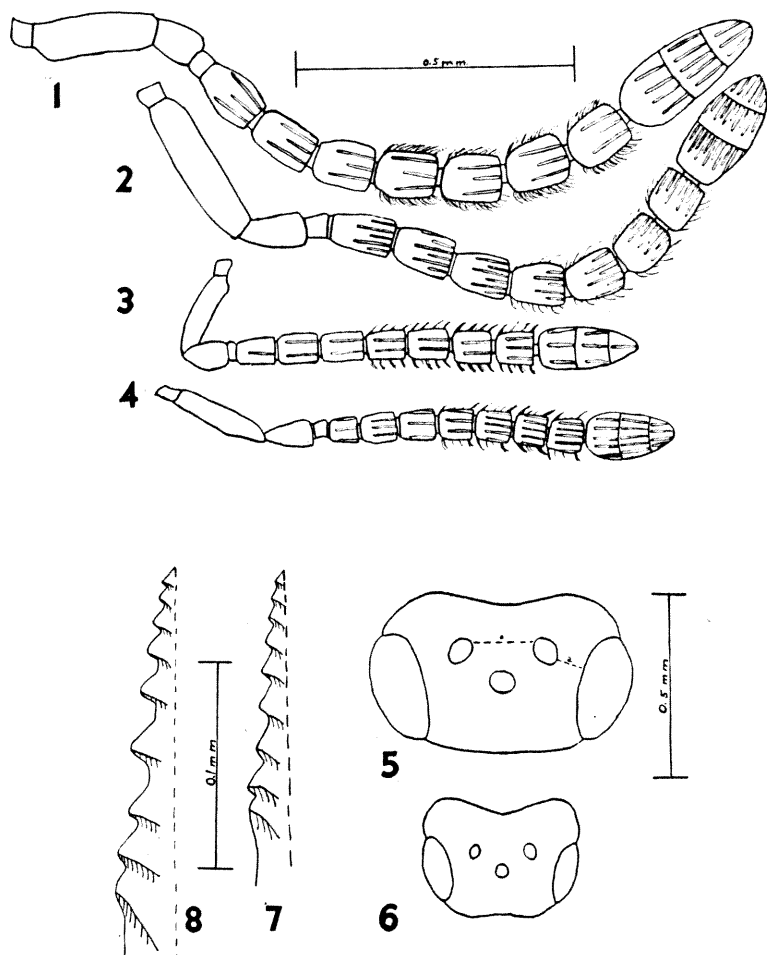


PLATE I

1. Antenna, male, *Tormus pachypsylae* (Ash.). Setal pattern shown only on last four segments of funicle.
2. Antenna, female, *T. pachypsylae*.
3. Antenna, male, *Tormus vesiculi* n. sp.
4. Antenna, female, *T. vesiculi*.
5. Head, dorsal view, *T. pachypsylae*.
 - a. ocellular distance.
 - b. lateral ocellar line.
6. Head, dorsal view, *T. vesiculi*.
7. Ovipositor saw, lateral view, *T. vesiculi*.
8. Ovipositor saw, lateral view, *T. pachypsylae*.

evidence from Texas showing that more parasitoids attack it in the southern United States. At Ithaca, N. Y. *Psyllophagus pachypsyllae* attacks it to some extent and a larva which appears to be *Chrysocharoideus* n. sp. has been found once overwintering in a gall.



PLATE II

Photo of portion of leaf of *Celtis occidentalis* L. with light coming through leaf showing galls of *Pachypsylla celtidis-vesicula*.

1. Black galls. Color due to dead leaf material. This color is typical of galls parasitized by any one of the parasitoids except those attacking the fifth instar.
2. Normal galls. *Pachypsylla celtidis-vesicula* may be inside.

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